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ABSTRACT

Described is a computer program written in FORTRAN IV which offers considerable flexibility in generating simulated data pertinent to education and educational psychology. The user is allowed to specify the number of samples, data sets, and variables, together with the population means, standard deviations and intercorrelations. In addition the format and method of data output may be specified. (WBC)

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GENERAL DATA SIMULATION PROGRAM

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IR004396

The simulation of data pertinent to education and educational psychology (e.g., IQ scores, achievement scores, normal random numbers) can be a useful teaching and research device. The purpose of the present paper was to describe a computer program, written in FORTRAN IV, which offers the user considerable flexibility in generating simulated data. The program described herein allows the user to specify the number of samples, the number of data sets comprising samples, the number of variables, and the population means, standard deviations and intercorrelations. In addition, the user can specify the format and method of data output.

Description

A complete description of the form of the control card and other data input is presented, via comment cards, in the program itself. The following will outline program limitations and general computing procedures.

The control card specifies the number of samples, the number of data sets (maximum = 99,999), the number of variables (maximum = 30), the number of factors used to generate population intercorrelations, the method for determining population means and standard deviations, the form of data output (none, paper, cards or paper/cards), the seed value for initiating the random number generator and an alphameric job description. The number of possible variables was set at 50 but this number can easily be changed by altering the dimension declaration and the format cards for intercorrelation and factor value output. Concerning population means and standard deviations, these will automatical-

ly be set to 0.0 and 1.0 respectively unless specified by the user. An option is available whereby population means and standard deviations will be equal to the initial values on the population mean and standard deviation cards.

The order of input cards is as follows: 1) control card, 2) format card for population mean and standard deviation cards (optional), 3) population mean card(s) (optional), 4) population standard deviation card(s) (optional), 5) format card(s) for factor values (optional), 6) factor value card(s) (optional), and 7) format card for data output. Steps 1 through 7 can be repeated as desired.

Normal random numbers (population means and standard deviations equal to 0.0 and 1.0 respectively) are generated using a modification of IBM System/360 Scientific Subroutine Package (1970) programs RANDU and GAUSS. If population intercorrelations have been specified using factor values (see Kaiser and Dickman, 1962), normal random numbers are transformed using the following formula:

$$Z = FX$$

where Z is a vector of numbers drawn from a population having specified means, standard deviations and intercorrelations, F is a factor matrix of a correlation matrix (the population correlation matrix) R, and X is a vector of normal random numbers having means of 0.0 and standard deviations of 1.0. If specified, scores are transformed using user supplied population means and standard deviations.

If indicated, data sets are printed and/or punched. After

the sample has been generated, sample means, standard deviations and intercorrelations are calculated and printed. The sample intercorrelations are presented in the upper triangle of the correlation matrix. The population intercorrelations, as determined from the factor values, are presented in the lower triangle of the correlation matrix. Finally, the factor value input is printed.

Sample Input

```
    1 3000     7     0     0     0 546321297      SAMPLE SIMULATION A
    2   50     4     4     2     1 653212391      SAMPLE SIMULATION B
  (10F8.0)
    20.0     32.0     15.6     32.0
    10.0     16.0     15.0     15.0
  (10F8.4)
 0.87318 0.21025 0.26145-0.35355
 0.87318 0.21025 0.26145 0.35355
 0.75304 0.06490-0.65476 0.00000
 0.47443-0.87693 0.07691 0.00000
    (5X, 3I6, 4F8.2)
    1   25   10     0     1     1 979562319      SAMPLE SIMULATION C
  (F5.3)
100.0
 15.0
    (5X, 3I5, 10F6.0)
```

The next section contains the data simulation FORTRAN IV program. This is followed by the output for the above three simulation examples.

Program

```
C      1. CONTROL CARD:
C         COLS. 1 - 5 = NUMBER OF SAMPLES.
C         COLS. 6 - 10 = NUMBER OF DATA SETS PER SAMPLE.
C         COLS. 14 - 15 = NUMBER OF VARIABLES.
C         COLS. 19 - 20 = NUMBER OF FACTOR VALUES.
C         COL. 25 = MEAN/SD OPTION: IF 0 THEN MEAN IS 0.0 AND SD IS 1.0;
C                   IF 1 THEN MEANS AND SD'S OF ALL VARIABLES EQUAL TO
C                   FIRST FIELDS ON MEAN AND SD CARD; IF 2 THEN MEANS
C                   AND SD'S SPECIFIED BY USER.
C         COL. 30 = OUTPUT OPTION: 0 - NO DATA; 1 - PRINTED DATA; 2 -
C                   PUNCHED DATA; 3 - PRINTED AND PUNCHED DATA.
C         COLS. 31 - 40 = SEED VALUE.
C         COLS. 41 - 80 = ALPHAMERIC JOB DESCRIPTION.
C      2. MEAN AND STANDARD DEVIATION FORMAT CARD (IF NECESSARY).
C      3. INPUT MEAN CARD(S).
C      4. INPUT STANDARD DEVIATION CARD(S).
C      5. FORMAT CARD FOR FACTOR VALUES (IF NECESSARY).
C      6. FACTOR VALUE CARD(S).
C      7. FORMAT CARD FOR DATA OUTPUT (IF NECESSARY). THE FIRST THREE VALUES
C         OF THIS CARD SHOULD BE INTEGERS TO INDICATE PROBLEM, SAMPLE AND
C         DATA SET NUMBER.
C READ CONTROL CARD, MEANS, STANDARD DEVIATIONS AND FACTOR VALUES.
      DIMENSION DES(10),XMI(30),SDI(30),FACT(30,30),X(30),R(30),COR(30,3
     10),SDO(30),SUM(30),FMS(20),FOUT(20),FFV(20)
      NPROB=1
   10 READ(5,15, END=155) NR,NSUB,NV,NF,MS,NOUT,ISEED,(DES(I),I=1,10)
   15 FORMAT(6I5, I10, 10A4)
      DO 16 I=1,NV
      XMI(I)=0.0
      SDI(I)=0.0
      DO 16 J=1,NV
   16 FACT(I,J)=0.0
      IF(MS .EQ. 0) GO TO 25
      READ(5,20) (FMS(I), I=1,20)
   20 FORMAT(20A4)
      IF(MS .EQ. 1) MC=MS
      IF(MS .EQ. 2) MC=NV
      READ(5,FMS) (XMI(I), I=1,MC)
      READ(5,FMS) (SDI(I), I=1,MC)
   25 CONTINUE
      IF(NF .EQ. 0) GO TO 40
      READ(5,34) (FFV(I), I=1,20)
   34 FORMAT(20A4)
      DO 35 I=1,NV
      READ(5,FFV) (FACT(I,J), J=1,NF)
   35 CONTINUE
   40 CONTINUE
      IF(MS .NE. 1) GO TO 42
      DO 41 I=1,NV
      XMI(I)=XMI(1)
```

```
   41 SDI(I)=SDI(1)
   42 CONTINUE
      IF(NOUT .NE. 0) READ(5,43) (FOUT(I), I=1,20)
   43 FORMAT(20A4)
C
C SIMULATE AND OUTPUT DATA SETS.
      DO 145 NRUNS=1,NR
      MSEED=ISEED
      DO 45 I=1,NV
      DO 45 J=1,NV
      SUM(I)=0.0
   45 COR(I,J)=0.0
      IF(NOUT .NE. 0) (WRITE(6,47) NPROB, NRUNS
   47 FORMAT('1',5X,'RAW SCORE DATA FOR PROBLEM',I3,' RUN',I3//)
      DO 90 IFIN=1,NSUB
      DO 55 I=1,NV
      R(I)=0.0
      DO 50 K=1,12
      ISEED=ISEED * 65539
      IF(ISEED .LT. 0) ISEED=ISEED + 2147483647 + 1
      RAND=ISEED
   50 R(I)=R(I) + (RAND * .4656613E-9 - .4995)
      IF(NF .EQ. 0) X(I)=R(I)
   55 CONTINUE
      IF(NF .EQ. 0) GO TO 65
      DO 60 I=1,NV
      X(I)=0.0
      DO 60 J=1,NF
   60 X(I)=X(I) + FACT(I,J) * R(J)
   65 CONTINUE
      IF(MS .EQ. 0) GO TO 75
      DO 70 I=1,NV
      X(I)=X(I) * SDI(I) + XMI(I)
   70 CONTINUE
   75 CONTINUE
      DO 80 I=1,NV
      SUM(I)=SUM(I) + X(I)
      DO 80 J=I,NV
   80 COR(I,J)=COR(I,J) + X(I) * X(J)
      IF(NOUT .EQ. 1 .OR. NOUT .EQ. 3) WRITE(6,FOUT) NPROB, NRUNS, IFIN,
     1(X(I), I=1,NV)
      IF(NOUT .EQ. 2 .OR. NOUT .EQ. 3) WRITE(7,FOUT) NPROB, NRUNS, IFIN,
     1(X(I), I=1,NV)
   90 CONTINUE
C
C CALCULATE MEANS, STANDARD DEVIATIONS AND INTERCORRELATIONS.
      SUB=NSUB
      DO 95 I=1,NV
      SDO(I)=SQRT((COR(I,I) - SUM(I)**2/SUB) / SUB)
   95 SUM(I)=SUM(I) / SUB
      DO 100 I=1,NV
      DO 100 J=I,NV
      COR(I,J)+(COR(I,J) / SUB - SUM(I) * SUM(J)) / (SDO(I) * SDO(J)
```

```
      DO 100 K=1,NF
      IF(I .EQ. J) GO TO 100
      COR(J,I)=COR(J,I) + FACT(I,K) * FACT(J,K)
  100 CONTINUE
C
C OUTPUT CONTROL SPECIFICATIONS AND SAMPLE STATISTICS.
      WRITE(6,105) (DES(I),I=1,10),NPROB,NRUNS,NSUB,NV,NF,MS,NOUT,MSEED
  105 FORMAT('1',5X, 'CONTROL CARD'///5X,'JOB DESCRIPTION',10A4//5X,'PRO
     1BLEM NO.',5X,I6//5X,'RUN NO.',9X,I6//5X,'NO. OF DATA SETS',I6//5X,
     2'NO. OF VARIABLES',I6//5X,'NO. OF FACTORS',I8//5X,'MEAN/SD OPTION'
     3,I8//5X,'OUTPUT OPTION',I9//5X,'SEED VALUE',I12/////5X, 'MEANS AND
     4 STANDARD DEVIATIONS'///5X, 'VARIABLE',6X, 'MEAN IN',5X,'SD IN',5X
     5,'MEAN OUT',4X,'SD OUT'//)
      DO 115 I=1,NV
      WRITE(6,110) I, XMI(I), SDI(I), SUM(I), SDO(I)
  110 FORMAT(6X, I3, 6X, 4F11.3)
  115 CONTINUE
      WRITE(6,120) NPROB, NRUNS
  120 FORMAT('1',5X,'CORRELATION MATRIX FOR PROBLEM',I3,' RUN',I3//)
      DO 130 I=1,NV
      WRITE(6,125) I, (COR(I,J),J=1,NV)
  125 FORMAT(5X,'ROW',I3/5X,7F9.4,7(/5X,7F9.4))
  130 CONTINUE
      IF(NF .EQ. 0) GO TO 150
      WRITE(6,135) NPROB, NRUNS
  135 FORMAT('1',5X,'FACTOR INPUT FOR PROBLEM',I3,' RUN',I3//)
      DO 145 I=1,NV
      WRITE(6,140) I, (FACT(I,J),J=1,NF)
  140 FORMAT(5X,'VARIABLE',I3/5X,7F9.4,7(/5X,7F9.4))
  145 CONTINUE
  150 CONTINUE
      NPROB=NPROB + 1
      GO TO 10
  155 STOP
      END
```

CONTROL CARD

JOB DESCRIPTION	SAMPE SIMULATION A
PROBLEM NO.	1
RUN NO.	1
NO. OF DATA SETS	3000
NO. OF VARIABLES	7
NO. OF FACTORS	0
MEAN/SD OPTION	0
OUTPUT OPTION	0
SEED VALUE	546321297

MEANS AND STANDARD DEVIATIONS

VARIABLE	MEAN IN	SD IN	MEAN OUT	SD OUT
1	0.0	0.0	0.006	0.987
2	0.0	0.0	0.027	0.984
3	0.0	0.0	0.021	1.003
4	0.0	0.0	-0.039	1.010
5	0.0	0.0	-0.020	1.005
6	0.0	0.0	-0.016	0.999
7	0.0	0.0	0.016	1.012

CORRELATION MARTIX FOR PROBLEM 1 RUN 1

ROW 1						
1.0000	0.0243	0.0009	0.0291	0.0399	-0.0110	0.0046
ROW 2						
0.0	1.0000	0.0069	0.0085	-0.0132	0.0093	-0.0135
ROW 3						
0.0	0.0	1.0000	0.0053	0.0042	-0.0175	0.0091
ROW 4						
0.0	0.0	0.0	1.0000	0.0121	-0.0011	-0.0177
ROW 5						
0.0	0.0	0.0	0.0	1.0000	-0.0383	-0.0066
ROW 6						
0.0	0.0	0.0	0.0	0.0	1.0000	0.0015
ROW 7						
0.0	0.0	0.0	0.0	0.0	0.0	1.0000

RAW SCORE DATA FOR PROBLEM 2 RUN 1

2	1	1	19.22	32.24	23.72	72.50
2	1	2	9.44	26.38	26.31	23.58
2	1	3	29.07	37.89	20.52	36.51
2	1	4	37.06	69.28	28.97	29.71
2	1	5	11.44	25.62	3.39	53.32
2	1	6	10.42	15.93	10.02	38.90
2	1	7	14.11	20.73	25.07	35.84
2	1	8	22.61	48.96	-9.48	20.75
2	1	9	10.09	8.02	-9.44	41.64
2	1	10	34.50	60.23	33.85	11.91
2	1	11	16.74	20.68	9.12	37.58
2	1	12	25.68	28.14	-3.83	30.41
2	1	13	24.38	25.99	9.30	26.30
2	1	14	28.36	37.92	21.31	40.62
2	1	15	16.39	14.05	20.36	50.01
2	1	16	28.16	66.27	17.94	36.77
2	1	17	43.53	60.15	66.06	46.52
2	1	18	4.14	22.85	12.13	33.81
2	1	19	8.15	13.47	-9.47	12.99
2	1	20	20.38	43.90	19.05	24.26
2	1	21	26.55	42.82	25.30	20.88
2	1	22	24.87	34.58	31.39	23.16
2	1	23	45.38	45.62	42.46	37.24
2	1	24	20.12	9.98	22.13	29.47
2	1	25	25.59	44.00	23.11	40.90
2	1	26	32.88	46.58	40.86	40.86
2	1	27	40.12	58.18	57.83	43.89
2	1	28	23.61	46.89	42.41	29.24
2	1	29	2.63	12.02	-3.38	20.46
2	1	30	27.87	22.30	21.39	20.97
2	1	31	33.94	36.34	18.98	31.29
2	1	32	15.57	26.22	11.18	16.36
2	1	33	8.03	14.07	0.42	43.78
2	1	34	30.68	38.23	36.85	25.14
2	1	35	4.64	21.62	-2.86	8.82
2	1	36	34.46	63.96	27.68	26.09
2	1	37	31.12	64.85	27.61	38.91
2	1	38	20.35	24.77	21.98	28.14
2	1	39	45.49	70.66	40.49	43.82
2	1	40	28.89	53.15	21.71	42.97
2	1	41	24.80	30.35	5.09	29.82
2	1	42	16.66	22.76	31.78	23.60
2	1	43	22.94	24.21	12.52	30.38
2	1	44	18.84	34.92	30.11	15.22
2	1	45	8.91	30.68	-8.20	13.55
2	1	46	14.35	32.98	3.45	37.42
2	1	47	17.98	32.37	15.91	41.75
2	1	48	17.30	50.59	40.19	61.80
2	1	49	24.72	39.23	19.70	4.10
2	1	50	26.05	39.57	19.03	64.65

CONTROL CARD

JOB DESCRIPTION	SAMPLE SIMULATION B
PROBLEM NO.	2
RUN NO.	1
NO. OF DATA SETS	50
NO. OF VARIABLES	4
NO. OF FACTORS	4
MEAN/SD OPTION	2
OUTPUT OPTION	1
SEED VALUE	653212391

MEANS AND STANDARD DEVIATIONS

VARIABLE	MEAN IN	SD IN	MEAN OUT	SD OUT
1	20.000	10.000	22.564	10.538
2	32.000	16.000	35.863	16.523
3	15.600	15.000	19.840	16.578
4	32.000	15.000	32.772	13.893

CORRELATION MARTIX FOR PROBLEM 2 RUN 1

ROW 1
1.0000 0.7723 0.6954 0.1485
ROW 2
0.7500 1.0000 0.5956 0.1241
ROW 3
0.5000 0.5000 1.0000 0.2480
ROW 4
0.2500 0.2500 0.2500 1.0000

FACTOR INPUT FOR PROBLEM 2 RUN 1

```
VARIABLE  1
   0.8732    0.2103    0.2614   -0.3536
VARIABLE  2
   0.8732    0.2103    0.2614    0.3536
VARIABLE  3
   0.7530    0.0649   -0.6548    0.0
VARIABLE  4
   0.4744   -0.8769    0.0769    0.0
```

RAW SCORE DATA FOR PROBLEM 2 RUN 2

2	2	1	34.85	65.83	40.85	45.41
2	2	2	24.50	30.51	35.70	21.31
2	2	3	22.38	42.04	21.09	37.11
2	2	4	22.02	26.78	37.26	46.56
2	2	5	31.14	54.66	9.79	22.16
2	2	6	20.45	53.71	12.82	24.71
2	2	7	11.93	19.07	-0.14	26.30
2	2	8	23.23	26.02	-1.71	25.56
2	2	9	19.11	27.65	14.60	21.91
2	2	10	15.82	21.99	30.48	31.40
2	2	11	21.27	35.49	19.92	33.32
2	2	12	12.81	19.48	50.47	49.54
2	2	13	17.29	23.61	18.00	45.32
2	2	14	13.83	17.61	2.75	13.24
2	2	15	26.13	61.67	28.24	26.90
2	2	16	28.89	54.77	30.27	30.41
2	2	17	23.47	36.93	12.13	33.57
2	2	18	20.87	37.35	8.28	39.34
2	2	19	26.13	26.96	19.01	52.29
2	2	20	9.63	8.18	-5.28	28.27
2	2	21	6.63	15.82	8.84	55.92
2	2	22	32.08	48.67	49.49	15.14
2	2	23	37.22	56.62	43.75	46.79
2	2	24	7.64	18.33	16.50	42.39
2	2	25	31.55	39.20	31.20	39.97
2	2	26	27.27	39.78	17.96	28.63
2	2	27	21.09	19.32	9.73	36.71
2	2	28	43.76	71.19	36.72	46.04
2	2	29	22.84	29.58	37.03	14.54
2	2	30	24.63	60.30	32.01	35.35
2	2	31	25.37	23.11	17.15	44.16
2	2	32	18.20	38.90	29.89	49.15
2	2	33	33.04	34.95	20.01	41.07
2	2	34	26.21	43.49	6.27	46.95
2	2	35	11.58	38.25	13.46	3.28
2	2	36	28.67	64.41	31.87	50.74
2	2	37	20.90	32.45	30.70	32.40
2	2	38	21.73	38.66	15.84	20.18
2	2	39	21.17	27.09	25.28	28.41
2	2	40	7.24	14.22	-9.36	24.75
2	2	41	21.53	30.87	9.25	30.95
2	2	42	25.55	55.37	47.57	52.59
2	2	43	10.45	-3.19	-6.83	15.39
2	2	44	6.72	16.00	17.70	0.40
2	2	45	5.86	26.84	4.30	31.87
2	2	46	1.05	-1.05	7.15	31.80
2	2	47	31.35	28.37	14.40	25.79
2	2	48	11.31	19.71	14.90	29.96
2	2	49	11.91	11.20	-1.80	33.49
2	2	50	17.44	23.28	6.11	43.06

CONTROL CARD

JOB DESCRIPTION	SAMPLE SIMULATION B
PROBLEM NO.	2
RUN NO.	2
NO. OF DATA SETS	50
NO. OF VARIABLES	4
NO. OF FACTORS	4
MEAN/SD OPTION	2
OUTPUT OPTION	1
SEED VALUE	314586583

MEANS AND STANDARD DEVIATIONS

VARIABLE	MEAN IN	SD IN	MEAN OUT	SD OUT
1	20.000	10.000	20.755	9.011
2	32.000	16.000	33.040	17.054
3	15.600	15.000	19.232	14.916
4	32.000	15.000	33.050	12.603

CORRELATION MARTIX FOR PROBLEM 2 RUN 2

ROW 1
1.0000 0.7843 0.5510 0.2567
ROW 2
0.7500 1.0000 0.5849 0.2212
ROW 3
0.5000 0.5000 1.0000 0.2914
ROW 4
0.2500 0.2500 0.2500 1.0000

FACTOR INPUT FOR PROBLEM 2 RUN 2

VARIABLE 1
0.8732 0.2103 0.2614 -0.3536
VARIABLE 2
0.8732 0.2103 0.2614 0.3536
VARIABLE 3
0.7530 0.0649 -0.6548 0.0
VARIABLE 4
0.4744 -0.8769 0.0769 0.0

RAW SCORE DATA FOR PROBLEM 3 RUN 1

3	1	1	93.	112.	111.	87.	90.	101.	109.	100.	80.	115.
3	1	2	119.	93.	104.	73.	107.	86.	86.	93.	90.	130.
3	1	3	133.	102.	116.	100.	85.	103.	70.	113.	70.	117.
3	1	4	82.	95.	82.	138.	90.	94.	61.	119.	76.	116.
3	1	5	126.	89.	119.	94.	117.	126.	104.	100.	116.	101.
3	1	6	84.	104.	117.	111.	100.	93.	87.	108.	121.	86.
3	1	7	86.	105.	72.	91.	117.	75.	109.	104.	97.	112.
3	1	8	103.	124.	107.	118.	80.	107.	101.	104.	126.	87.
3	1	9	91.	97.	78.	85.	95.	98.	104.	96.	102.	126.
3	1	10	76.	74.	91.	112.	91.	92.	116.	110.	72.	95.
3	1	11	101.	103.	94.	73.	76.	120.	98.	80.	76.	103.
3	1	12	91.	97.	93.	105.	110.	94.	104.	116.	120.	89.
3	1	13	109.	105.	122.	115.	92.	99.	101.	106.	130.	100.
3	1	14	106.	103.	96.	83.	99.	88.	101.	101.	107.	109.
3	1	15	112.	57.	110.	94.	114.	101.	80.	110.	79.	83.
3	1	16	125.	77.	100.	112.	117.	127.	112.	89.	109.	81.
3	1	17	124.	113.	98.	106.	104.	121.	113.	74.	98.	114.
3	1	18	83.	98.	81.	108.	87.	115.	103.	95.	103.	125.
3	1	19	100.	82.	67.	114.	113.	95.	99.	117.	113.	90.
3	1	20	93.	113.	103.	111.	86.	112.	102.	119.	98.	82.
3	1	21	106.	107.	94.	114.	64.	113.	88.	123.	112.	92.
3	1	22	95.	101.	115.	104.	119.	102.	95.	92.	134.	93.
3	1	23	118.	108.	106.	106.	105.	102.	107.	97.	84.	100.
3	1	24	120.	104.	116.	87.	88.	105.	115.	110.	107.	125.
3	1	25	103.	101.	95.	106.	103.	97.	91.	93.	99.	110.

CONTROL CARD

JOB DESCRIPTION	SAMPLE SIMULATION C
PROBLEM NO.	3
RUN NO.	1
NO. OF DATA SETS	25
NO. OF VARIABLES	10
NO. OF FACTORS	0
MEAN/SD OPTION	1
OUTPUT OPTION	1
SEED VALUE	979562319

MEANS AND STANDARD DEVIATIONS

VARIABLE	MEAN IN	SD IN	MEAN OUT	SD OUT
1	100.000	15.000	103.143	15.569
2	100.000	15.000	98.557	13.898
3	100.000	15.000	99.458	14.762
4	100.000	15.000	101.795	14.918
5	100.000	15.000	97.958	14.242
6	100.000	15.000	102.667	12.453
7	100.000	15.000	98.267	13.362
8	100.000	15.000	102.843	12.124
9	100.000	15.000	100.745	18.367
10	100.000	15.000	103.121	14.985

CORRELATION MARTIX FOR PROBLEM 3 RUN 1

ROW 1
1.0000 -0.0179 0.5054 -0.2515 0.1571 0.4426 -0.0200
-0.2597 -0.0075 0.0713
ROW 2
0.0 1.0000 0.1535 0.0231 -0.4577 0.0321 0.1260
-0.1198 0.2535 0.2161
ROW 3
0.0 0.0 1.0000 -0.1060 -0.0140 0.2654 -0.0605
-0.0624 0.1904 -0.1706
ROW 4
0.0 0.0 0.0 1.0000 -0.1159 0.0989 -0.2511
0.4308 0.2122 -0.4359
ROW 5
0.0 0.0 0.0 0.0 1.0000 -0.1967 0.1558
-0.2354 0.2059 -0.1509
ROW 6
0.0 0.0 0.0 0.0 0.0 1.0000 0.2015
-0.3461 0.0911 -0.2105
ROW 7
0.0 0.0 0.0 0.0 0.0 0.0 1.0000
-0.3576 0.2488 -0.0490
ROW 8
0.0 0.0 0.0 0.0 0.0 0.0 0.0
1.0000 0.0294 -0.2926
ROW 9
0.0 0.0 0.0 0.0 0.0 0.0 0.0
0.0 1.0000 -0.3331
ROW 10
0.0 0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 1.0000

References

Kaiser, H., and Dickman, K. Sample and population score matrices and sample correlation matrices from an arbitrary population correlation matrix. Psychometrika, 1962, 27, 179-182.

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